

NON-PUBLIC?: N
ACCESSION #: 9406170200
LICENSEE EVENT REPORT (LER)

FACILITY NAME: St. Lucie Unit 1 PAGE: 1 OF 05

DOCKET NUMBER: 05000335

TITLE: Automatic Reactor Trip caused by 1A Main Transformer
Differential Current Trip due to contact with metal fascia
dislodged from a nearby building during inclement
weather.
EVENT DATE: 06/06/94 LER #: 94-005-00 REPORT DATE: 06/13/94

OTHER FACILITIES INVOLVED: N/A DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 097

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: James A. Hurchalla, Shift Technical TELEPHONE: (407) 465-3550
Advisor

COMPONENT FAILURE DESCRIPTION:
CAUSE: C SYSTEM: EL COMPONENT: XFMR MANUFACTURER: ----
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On June 6, 1994, at 1508 with Unit 1 at 97% power, during a period of thunderstorm and high wind activity a piece of aluminum fascia from a storage building became airborne and struck the Unit 1A Main Transformer. The aluminum fascia contacted two phases on the output of the 1A Main Transformer which caused a Main Transformer differential current trip. The Unit 1 Main Turbine tripped from the Main Generator lockout and resulted in an automatic reactor trip. Standard post trip actions were performed, the normal Reactor Trip Recovery procedure was implemented and all safety functions were satisfactory.

The root cause of the reactor trip was due to natural phenomenon in the form of high winds from localized thunderstorm activity. Gusting winds

from the thunderstorm tore loose a piece of aluminum fascia from a permanent storage building in the vicinity of the 1A Main Transformer and caused it to become airborne and strike the transformer output bushings.

Corrective actions for this event include: 1) Operations stabilized the unit in mode 3. 2) A visual inspection for loose materials on buildings nearby the Main Transformers has been performed with satisfactory results. 3) An internal visual inspection was performed on the Main Generator with satisfactory results. 4) Electrical tests were performed on the Main Generator, Isophase buses, and the 1B Main Transformer with no damage observed. 5) The 1A Main Transformer will be restored and tested prior to ascension to full rated power. 6) The fascia on the storage facility was secured using additional fasteners. 7) Additional review criteria will be developed for periodic inspections of buildings in the vicinity of the transformers.

END OF ABSTRACT

TEXT PAGE 2 OF 5

DESCRIPTION OF THE EVENT

On June 6, 1994, at 1508 with Unit 1 at 97% power, during a period of localized thunderstorm and high wind activity, a piece of aluminum fascia from the roof of a permanent storage building became airborne. The section of fascia consisted of a 10 foot by 8 inch piece of aluminum metal sheet which travelled approximately 100 feet and struck the 1A Main Transformer (EIIS:EL) contacting the "B" and "C" phase output bushings. The resulting phase to phase fault caused the Main generator (EIIS: TB) to trip on a Differential Current equipment protection relay actuation which tripped the Main Turbine (EIIS:TA) from the Main Generator primary lockout (equipment protective trip). The reactor automatically tripped from the Reactor Protection System (EIIS:JC) on Turbine "Loss of Load". Utility licensed operators conducted Emergency Operating Procedure (EOP)-1, "Standard Post Trip Actions" and diagnosed an uncomplicated reactor trip. Implementation of EOP-2, "Reactor Trip Recovery" confirmed an uncomplicated reactor trip and the plant was stabilized in mode 3, Hot Standby.

Each unit at St. Lucie has a Main Generator with a nominal terminal voltage of 22 KV, 3 phase AC which feeds two parallel Main Transformers via an enclosed isop
ase bus system. The side by side Main Transformers
step up the supplied voltage to 240 KV and reconnect to an overhead common high voltage line. This three phase 240 KV line is linked to an onsite switchyard that supplies power to and receives power from the

offsite electrical power grid. The Main Generator, each Main Transformer, and the onsite switchyard are provided with diverse electrical fault protection.

A visual inspection revealed electrical arc strike damage to the upper oil reservoir, electrical bushings and isophase bus ductwork for the 1A Main Transformer during phase to ground electrical faults.

A review by FPL personnel of recorded electrical generation system parameters indicated that the Main Generator fed the electrical fault at up to three times normal current values for approximately two seconds.

CAUSE OF THE EVENT

The root cause of this event was due to natural phenomenon in that high winds generated by localized thunderstorm activity caused the aluminum fascia from a building to come loose from a nearby building and strike the 1A Main Transformer. This building is a permanent concrete structure with a flat gravel roof located approximately 100 feet from the 1A Main Transformer. The aluminum fascia extends around the edge of the roof line and is overlapped and held in place with nails and roofing tar. Prior to this event, there were no noted structural deficiencies with respect to the fascia on the storage building.

The general wind direction in conjunction with a slope in ground level approaching the storage building also allowed greater access for wind forces to the exposed edge of the fascia. This wind direction and lift transported the aluminum to the 1A Main transformer and across the 'B' and 'C' phase bushings and created the fault that resulted in the unit trip.

TEXT PAGE 3 OF 5

ANALYSIS OF THE EVENT

This event is reportable under the requirements of 10CFR50.73.a.2.iv as "any event that resulted in manual or automatic action of any Engineered Safety Feature."

Examination of the Generator Continuous Monitoring System data indicated that the Main Generator continued to feed the faulted 1A Main Transformer following the reactor trip at current values up to three times normal for a period of approximately two seconds. The time required for the generator excitation field to substantially collapse is approximately four seconds. The design of the electrical distribution system is such that there is no automatic isolation between the Main Generator and the

Main Transformer. Therefore, although the generator/turbine protection system performed as designed, the generator continued to feed the affected transformer and fault until the generator electrical field dissipated.

Due to these indications, an internal inspection of the Main Generator was initiated. The results of the generator stator field to ground and phase to phase meggering and visual inspections provided assurance that the Main Generator was not adversely affected by this event.

The transformer fault caused a turbine trip by a generator primary lockout which resulted in an uncomplicated automatic reactor trip on Main Turbine generator Loss of Load as designed. The function of this reactor trip is described in the St. Lucie design basis as an equipment protective trip which is not required for reactor safety. This event is bounded by section 15.2.7 of the St. Lucie Unit 1 Final Updated Safety Analysis Report (FUSAR) "Loss of External Electrical Load." The actual plant response was more conservative than that described in the FUSAR for several reasons.

- 1) The actual power level was 97% versus the FUSAR analysis assumption of 100% power.
- 2) The Reactor Protection System actuated on "Loss of Load" versus "High Pressurizer Pressure" thereby minimizing the Reactor Coolant System (EIS:AB) temperature and pressure transient.
- 3) The Steam Bypass Control System (EIS:JI) functioned to quickly restore the Reactor Coolant System temperature to no load values.
- 4) Auxiliary Feedwater (EIS:BA) to the Steam Generators was not required as the 1A Main Feedwater Pump (EIS:SJ) supplied adequate feedwater to both SGs during the post trip recovery actions.
- 5) Both Unit 1 Startup Transformers (EIS:EA) were unaffected during this event and continued to provide off site electrical power after the plant trip.

Therefore, the health and safety of the public were not affected by this event.

TEXT PAGE 4 OF 5

CORRECTIVE ACTIONS

- 1) Operations personnel stabilized the plant in mode 3, Hot Standby.
- 2) Construction services has conducted a visual inspection of buildings in the vicinity of both Unit 1 and Unit 2's Main Transformers to identify and repair roofing material.

- 3) The remaining fascia on the damaged storage facility was more firmly attached with additional fasteners.
- 4) Construction Services will develop additional review criteria for periodic inspections of buildings in the vicinity of the Main and Startup Transformers for both Unit 1 and Unit 2.
- 5) An internal visual inspection was performed on the accessible portions of the Main Generator by Electrical Maintenance and Generator Original Equipment Manufacturer with satisfactory results.
- 6) Electrical Maintenance performed phase to phase and phase to ground meggering on the Main Generator to provide assurance of no damage to the stator and exciter field.
- 7) Electrical Maintenance has performed phase to ground meggering on the isophase bus system with satisfactory results.
- 9) Electrical Insulation and winding tests have been performed on the 1B Main Transformer with satisfactory results.
- 10) Repair of the 1A Main Transformer oil reservoir and isophase bus arc strikes, replacement of the 'C' phase bushing and 'B' phase corona bar will be completed prior to power ascension to full rated power.
- 11) Electrical testing of the 1A Main Transformer will be completed prior to ascension to full rated power.

TEXT PAGE 5 OF 5

ADDITIONAL INFORMATION

Failed Component Identification

1A Main Transformer bushing
Manufacturer: LAPP-Division of InterPace Corp.
Style: POC-A
Catalogue No.: B-67676-5770
KVA Rating: 196
Amp Rating (80 deg C): 3500
Basic Insulation Level: 900

Previous Similar Events

There are no St. Lucie LERs from 1984 to present for reactor trips at St.

Lucie due to electrical distribution faults.

ATTACHMENT TO 9406170200 PAGE 1 OF 1

P.O. Box 128, Ft. Pierce, FL 34954-0128

June 13, 1994

FPL

L-94-154
10 CFR 50.73

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Re: St. Lucie Unit 1
Docket No. 50-335
Reportable Event: 94-005
Date of Event: June 6, 1994
Automatic Reactor Trip caused by 1A Main Transformer Differential
Current Trip due to contact with metal facia dislodged from a nearby
building during inclement weather

The attached Licensee Event Report is being submitted pursuant to the
requirements of 10 CFR 50.73 to provide notification of the subject
event.

Very truly yours,

D. A. Sager
Vice President
St. Lucie Plant

DAS/JWH/kw

Attachment

cc: Stewart D. Ebnetter, Regional Administrator, USNRC Region II
Senior Resident Inspector, USNRC, St. Lucie Plant

DAS/PSL #1141-94

an FPL Group company

*** END OF DOCUMENT ***
